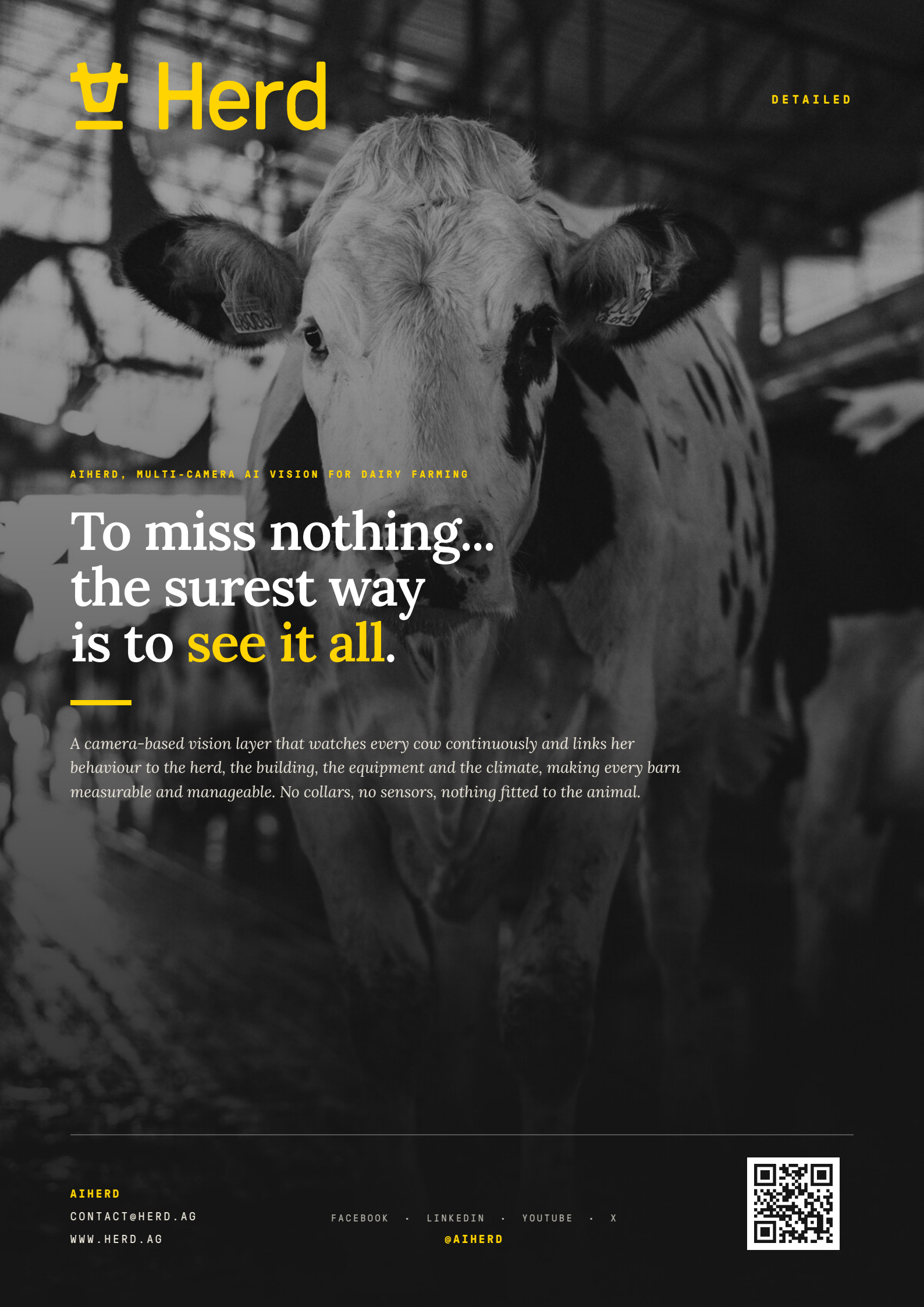
Herd

DETAILED



AIHERD, MULTI-CAMERA AI VISION FOR DAIRY FARMING

To miss nothing... the surest way is to see it all.

A camera-based vision layer that watches every cow continuously and links her behaviour to the herd, the building, the equipment and the climate, making every barn measurable and manageable. No collars, no sensors, nothing fitted to the animal.

AIHERD

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IN BRIEF

What AiHerd does.

AiHerd is a vision layer installed in the building. Cameras in the roof, a server on the farm, and an artificial intelligence that **recognises** every animal, **reads** her behaviour twenty-four hours a day, **spots** anything out of the ordinary, and brings everything together in a single **interface**. Where a sensor measures an acceleration, AiHerd sees the action, the place and the time. This document reads in two parts: first how the solution works, then what it lets you monitor, area by area.

24/7
CONTINUOUS OBSERVATION
night included

90%
HEAT DETECTION
silent heats included

0
SENSORS ON THE ANIMAL
no collar, no tag

5 MILLION
COW-DAYS FILMED
in real farming conditions



FEED FENCE ON A FARM EQUIPPED WITH AIHERD. NONE OF THESE ANIMALS WEARS A COLLAR OR A SENSOR.

PART 1

The principle

How a camera image becomes useful information, in four stages.

Stage 1 · The hardware

Stage 2 · Recognition

Stage 3 · Analysis

Stage 4 · The interface

PART 2

The areas

What AiHerd monitors for you today, and what it will monitor tomorrow.

Area 1 · Reproduction

Area 2 · Health

Area 3 · Safety

Area 4 · Smart building

Area 5 · Management, integration and correlations

PART 1: THE PRINCIPLE

How it works, in four stages.

None of these four stages requires touching the animals. Everything happens in the roof, in the map of the building, and in the software.



AN AIHERD CAMERA FIXED TO THE ROOF FRAME, ABOVE THE ANIMALS.

STAGE 1

The hardware

The building is scanned in three dimensions, the cameras are fitted where the scan says they should go, and a server installed on the farm runs the artificial intelligence.

STAGE 2

Recognition

Every animal is recognised, continuously and wherever she is on the farm, thanks to the **patterns of her coat**. It is the most complex building block of the chain, and it plays out in four steps: identification, detection, tracking and re-identification.

STAGE 3

Analysis

A second AI layer reads postures and behaviours, and spots anything out of the ordinary, in the image as in the statistics.

STAGE 4

The interface

Everything comes together in one place: the live map of the building, the view from every camera, the record of every cow, the alerts. In a browser and on mobile.

CAMERAS
in the roof

→

SERVER ON THE FARM
recognition, then analysis

→

INTERFACE
web and mobile

Three elements, and that is all. **Nothing to fit on the animal, nothing to recharge, nothing to replace.**

STAGE 1: THE HARDWARE

A scan, cameras, a server.

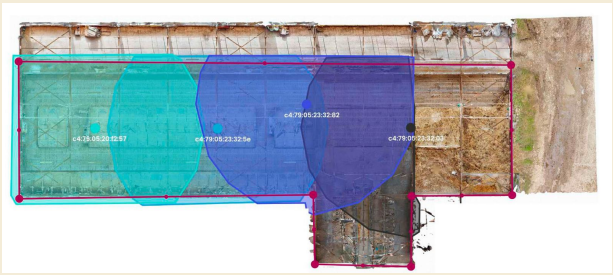
The scan comes first. Until the exact geometry of the building is known, there is no knowing where to fit a camera.

THE SCAN BEFORE ANYTHING ELSE

The building is surveyed with a 3D scanner before any installation. This point cloud becomes the map of your barn, and it dictates where the cameras go: height, angle, overlap. A cow seen through three different lenses then remains one and the same cow, in one and the same place.



POINT CLOUD FROM THE SCAN OF THE BUILDING



CAMERA OVERLAP ON THE MAP OF THE BUILDING

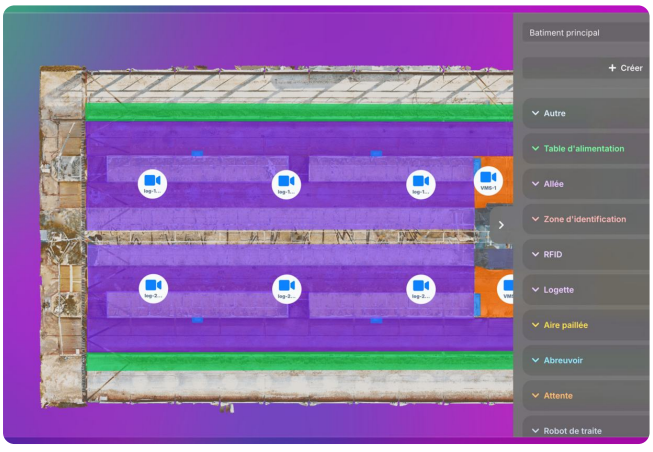
STANDARD CAMERAS, RECALIBRATED

No expensive 3D cameras and no depth sensors: standard wide-angle cameras, which we calibrate a first time in the lab, then a second time once fitted in the building.

They are fitted **roughly every fifteen metres**, with a clear overlap from one to the next. So far fewer are needed than you might think to cover a whole building.

ZONES THAT GIVE MEANING

On this map, we mark out the feed fence, the alley, the cubicles, the straw yard, the drinker, the holding area, the milking robot and the identification zone. A cow lying in a cubicle and a cow lying on the slats do not tell the same story: it is the place that gives the behaviour its meaning.



FUNCTIONAL ZONES MARKED ON THE MAP OF THE BUILDING

A SERVER ON THE FARM ITSELF

It runs the artificial intelligence and feeds your interface. The service does not stop when the internet goes down, the link being used only for remote access and updates. It also lets us diagnose most incidents before you even notice them.

STAGE 2: RECOGNITION

Recognising every animal, with nothing fitted to her.

Recognising a cow continuously, wherever she is on the farm, is the most complex building block of the chain. Every cow is identified by her coat: the patterns of a black-and-white or a red-and-white cow are as unique as a fingerprint, and **a model specific to your farm** learns to tell them apart.

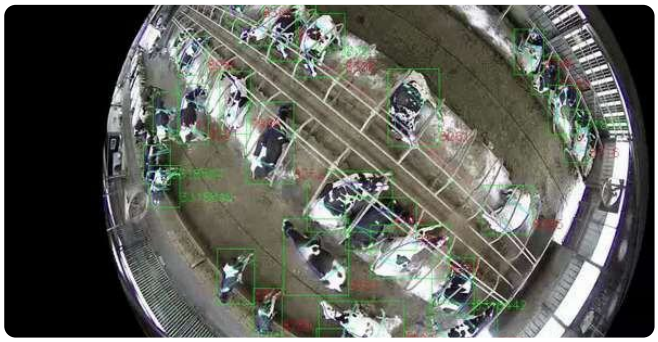


REFERENCE GALLERY: THE THUMBNAILS OF ONE ANIMAL, TAKEN FROM EVERY ANGLE

STEP 1

Identification

An RFID antenna placed in a passage zone reads the animal's working number. At that precise moment, the cameras take a series of photos of the cow from every angle. These images form her **reference gallery**: her visual identity, made of her patches and their outlines. Every cow on the farm has her own.

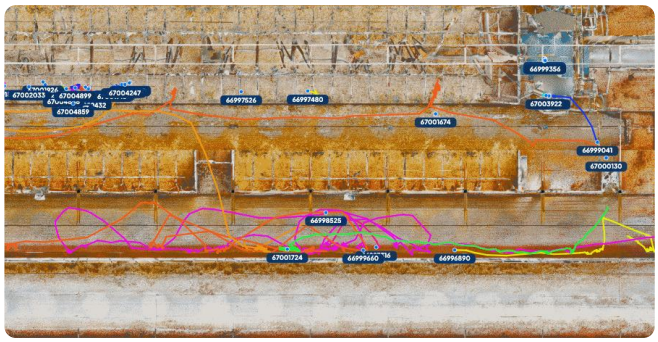


DETECTIONS ON A RAW IMAGE

STEP 2

Detection

On every image from every camera, the detector locates each animal: a box around her, **anatomical keypoints** (muzzle, legs, spine) and her posture, standing or lying. The whole chain depends on its quality: without good detection, neither tracking nor recognition works.

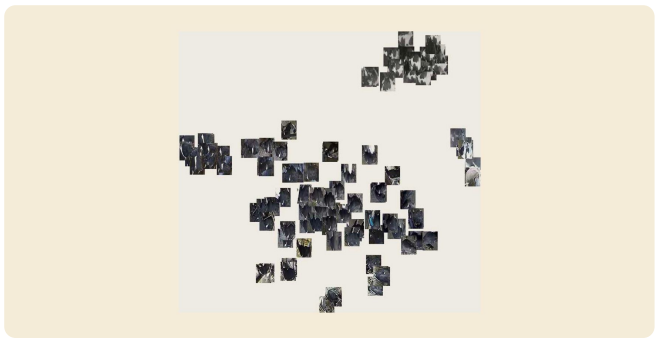


TRACKS FOLLOWED THROUGH THE BUILDING, FROM ONE CAMERA TO THE NEXT

STEP 3

Tracking

The detector works image by image, with no memory. Tracking adds time: it links the successive detections of the same animal, and hands her over from one camera to the next **without a break**. The result is tracks, continuous paths that then carry every analysis.



THE THUMBNAILS OF ALL TRACKS, COMPARED WITH THE HERD'S GALLERIES

STEP 4

Re-identification

What remains is to put a name on each track. The software selects the sharpest and most representative images, compares them with the reference galleries, then **assigns the identities of every cow in the herd**.

19

KEYPOINTS

placed on the skeleton of every animal

5

ANALYSES PER SECOND

for every animal in the building

0

SENSORS

the coat alone is enough to recognise the cow

STAGE 3: ANALYSIS

Reading behaviours, spotting anything out of the ordinary.

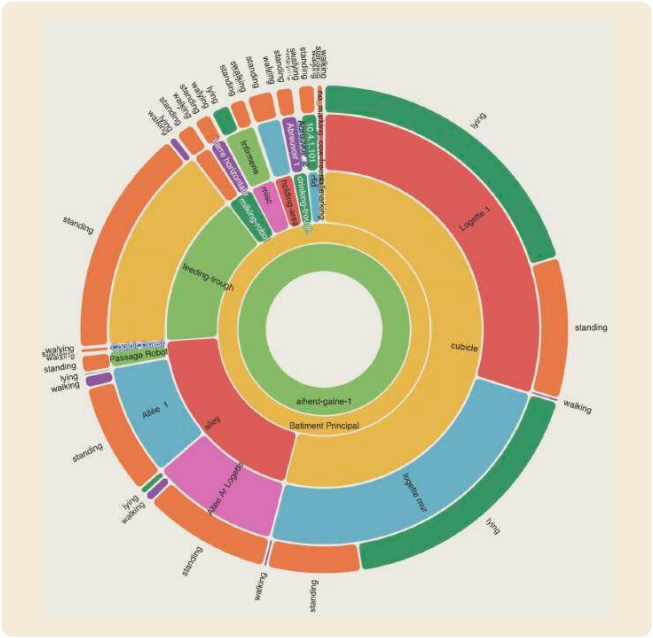
Heat, lameness and rumination are first of all **postures** and particular sequences of movements. A second layer of artificial intelligence recognises them in the image, as a trained eye would, but without ever taking its eyes off the animal.

POSTURES
Standing, lying, walking

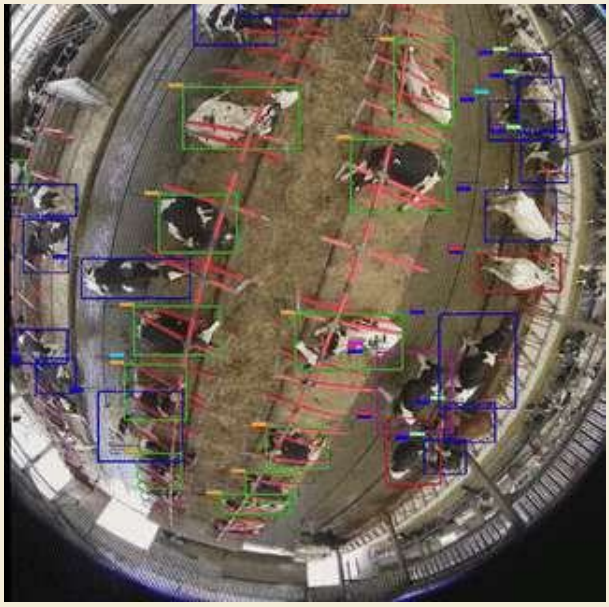
INTAKE
Feeding, drinking, rumination

CARE
Grooming, scratching, isolation

SOCIAL
Interactions, mounts, conflicts



BREAKDOWN OF TIME BY ZONE, THEN BY BEHAVIOUR, OVER ONE DAY.

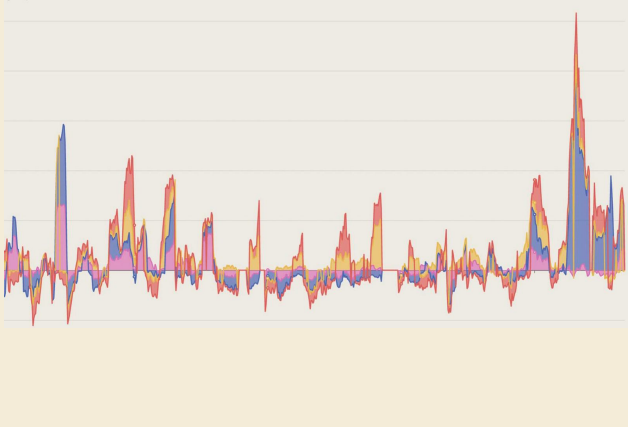


INTERPRETATION IN THE IMAGE: POSTURE, MOVEMENT AND INTERACTION OF EVERY ANIMAL.

ANYTHING OUT OF THE ORDINARY

The analysis does not stop at the image. It also covers the statistics that tracking produces: lying time, time at the drinker, time spent in a given zone, time on the move, number of contacts with herd mates. Every cow is compared with her own average, and the herd with its own history: **an anomaly is not read in an absolute figure, but in a deviation**.

Recorded over three days on an equipped farm: 55% of the time lying, 21% standing, 20% at the feed fence, 2% on the move. It is this balance, specific to each cow, that AiHerd makes visible.



ONE ANIMAL'S INTERACTIONS TRACKED OVER TIME, COMPARED WITH HER OWN HISTORY.

STAGE 4: THE INTERFACE

Everything arrives in one place.

You type in a cow's number and she appears in the barn, live. One click, and her whole day replays second by second. In a browser as on mobile.

THE MAP, THE CAMERA, THE RECORD

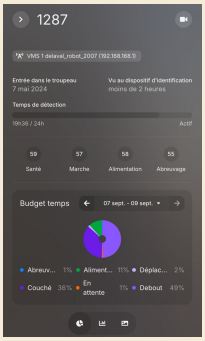
Three views of the same herd: the map of the building with every animal in her real place, the image from any camera, and the complete record of a cow, with her detection time over twenty-four hours, her four indicators and her time budget.

GOING BACK IN TIME

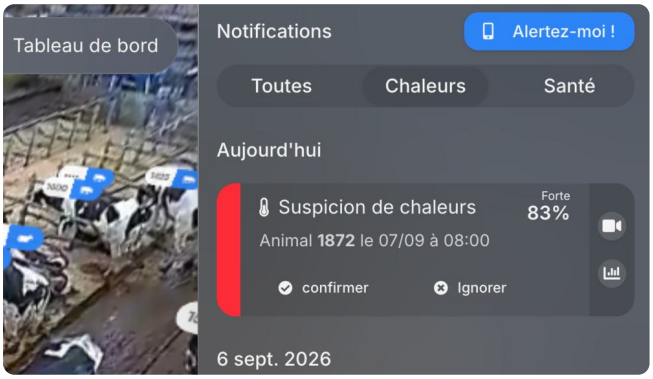
The whole history of the building is kept and can be replayed. You pick a day, an hour, and the scene starts again, up to sixteen times faster if you are looking for something. This is what turns an alert into an explanation: you go and see what happened.



LIVE VIEW: EVERY ANIMAL IS IDENTIFIED, TRACKED, AND HER POSTURE READ CONTINUOUSLY.



A COW'S RECORD: DETECTION TIME, INDICATORS, TIME BUDGET.



THE NOTIFICATIONS PANEL: TYPE, ANIMAL, TIME, CONFIDENCE LEVEL.



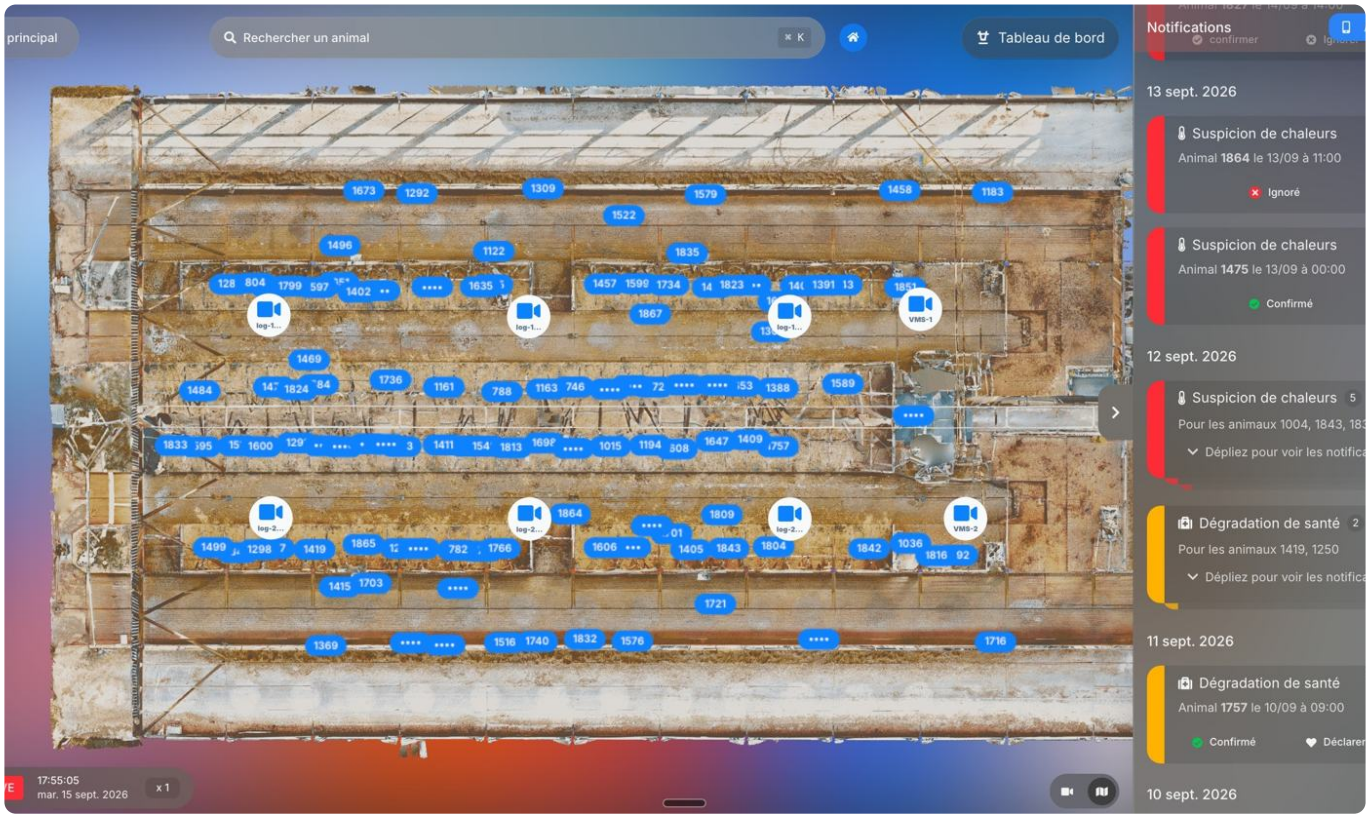
THE TIMELINE: YOU GO BACK TO THE DAY AND THE HOUR, AND REPLAY THE SCENE.

> *The interface is designed to be opened for three minutes in the morning, not to be studied. Alerts come up on their own, the rest is there when the question arises.*

PART 2: THE AREAS

Five areas, a single infrastructure.

The five areas run on the same cameras. Some are **already running on farm**, the rest arrives through a simple update, with nothing added to the building.



THE LIVE MAP OF THE BUILDING, AND THE NOTIFICATIONS FEED: HEATS AND HEALTH.

AREA 1

Reproduction

AiHerd spots heats, even silent ones. It flags a no return to heat, a pregnancy, an abortion. Calving detection is on its way.

AREA 2

Health

Four indicators track every cow continuously. The software detects lameness and explains its cause. A score ranks the animals to watch.

AREA 3

Safety

The building is filmed day and night. Any anomaly triggers an immediate alert, with video to back it. The history can always be consulted.

AREA 4

Smart building

You look for a cow, she appears on the map. One click opens the camera that sees her. The time spent in each zone is measured.

AREA 5

Management, integration and correlations

Everything arrives in a single interface, web and mobile. Every cow has her own record. The data exports to your farm software, and is cross-referenced with that of the milking robot, the ration or the weather.

AREA 1: REPRODUCTION

Heat, even when it is silent.

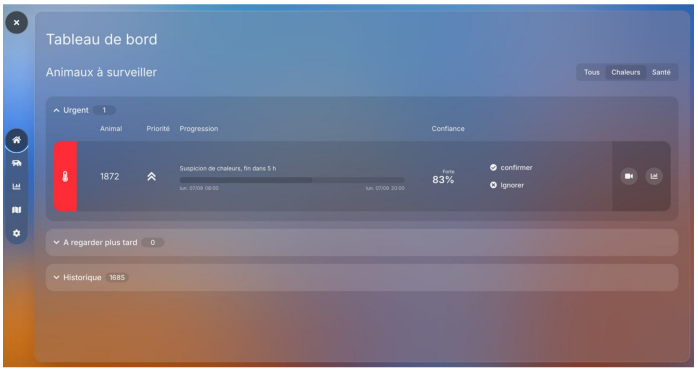
A missed heat is a lost cycle, that is **some twenty days' less milk**. It is the first item on which continuous observation pays for itself, and the one where AiHerd already achieves **90% detection**.

BRIEF SIGNS, OFTEN AT NIGHT

Heat signs are short and unpredictable, and a good share of them occur at night. Intermittent observation lets them slip by. AiHerd picks them up through interactions as much as through activity: a very high yielder in full heat does not take a single step more than usual, but **she draws the other cows to her**.

AN ALERT, A CONFIDENCE LEVEL, A DECISION

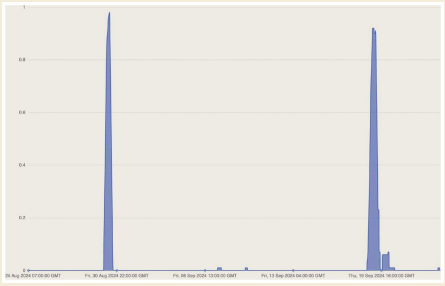
Every detection is time-stamped, linked to the animal, and comes with a confidence level and the time window remaining. The farmer reviews the video sequence, then confirms or dismisses: this feedback refines the model for his farm.



SUSPECTED HEAT ON ANIMAL 1872, HIGH CONFIDENCE, WINDOW CLOSING IN 5 H.



THE SEQUENCE BEHIND THE ALERT: AN ACTIVE MOUNT SPOTTED IN THE MIDDLE OF THE NIGHT, ANIMAL 1423 FLAGGED TO WATCH.



HEAT SIGNAL OVER 21 DAYS, ONE ANIMAL. TWO CLEAR PEAKS, A FLAT BASELINE IN BETWEEN.

TWENTY-ONE DAYS, TWO PEAKS

A cow's heat signal is read against her own cycle. Two clear peaks three weeks apart, a flat baseline in between: it is this shape, and not an absolute threshold, that triggers the alert.

A cow that does not come back into heat when expected is flagged too: it is the same signal, read the other way round. No return to heat after insemination points to a probable pregnancy; a heat that reappears when the cow was thought to be in calf signals a failure or an abortion, including after a confirmed pregnancy.

TODAY, ALREADY RUNNING ON FARM

- Heat detection
- Silent heats, picked up from visual micro-signals
- No return to heat, pregnancy, abortion
- Time-stamped video sequence to back every alert

IN DEVELOPMENT, OR PLANNED

- Calvings and dystocia, day and night
- Notification as soon as labour begins

AREA 2: HEALTH

Four indicators per cow, and lameness explained.

Every cow carries four indicators, read continuously and compared with her own baseline: **health, gait, feeding, drinking**. A drift comes up on its own, before the problem takes hold.

LAMENESS, DETECTED THEN EXPLAINED

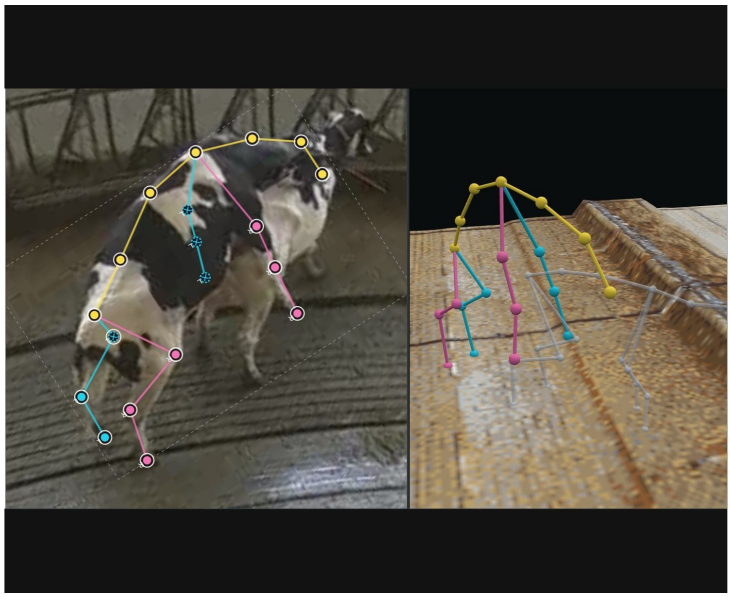
AiHerd analyses locomotion itself. The **nineteen keypoints** placed on the skeleton of every cow give the complete gait, legs included, and an emerging asymmetry shows before it costs milk. The software does not stop at the alert, it tells its cause: two hours earlier, that cow spent forty-five minutes with her leg caught in a gate, video sequence to prove it.

The same calculation, applied to every cow, gives a **locomotion score at herd level**: the proportion of animals affected and how it changes week after week, enough to plan trimming on figures rather than on impressions.

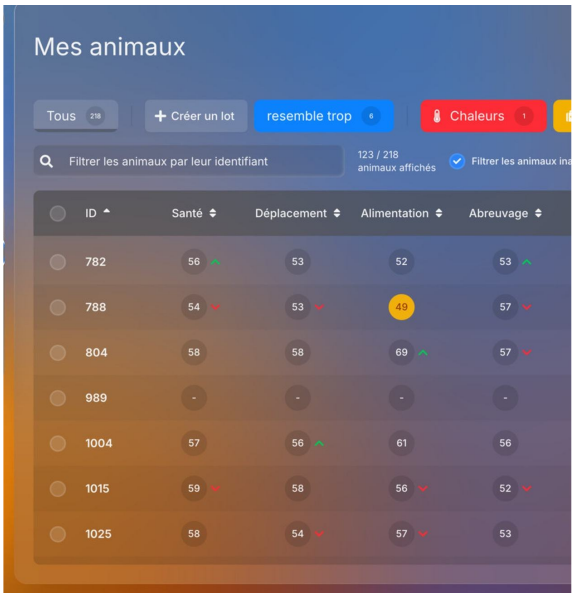
A HEALTH SCORE, TO KNOW WHERE TO START

The general health index is a **composite score**, calculated cow by cow from the behaviours AiHerd measures continuously: activity against her own baseline, time standing versus lying, time and frequency at the feed fence, visits to the drinker. It does not replace a diagnosis: it **ranks the animals to watch**, so that the morning round starts with the right cows.

Here again, there are two readings. A collapsed score on one cow points to that cow. **A distribution deteriorating across the whole herd** points to something else: a ration, the barn climate, a building. The herd has its own health index too, and it is often the first to speak.



THE KEYPOINTS PLACED ON THE ANIMAL, THEN THE FOUR LEGS RECONSTRUCTED IN THREE DIMENSIONS: THIS IS WHERE THE GAIT IS READ.



THE FOUR INDICATORS OF EVERY COW, ID BY ID, WITH THEIR TREND.

TODAY, ALREADY RUNNING ON FARM

- General health index, one score per cow
- Drop in activity, against her own baseline
- Time standing vs lying
- Drop in intake, time and frequency at the feed fence
- Any abnormal behaviour, even if not catalogued

IN DEVELOPMENT, OR PLANNED

- Lameness and continuous locomotion score
- Body condition and weight loss, read from the silhouette
- Rumination
- Respiratory rate, an early signal of heat stress

AREA 3: SAFETY

What happens when nobody is watching.

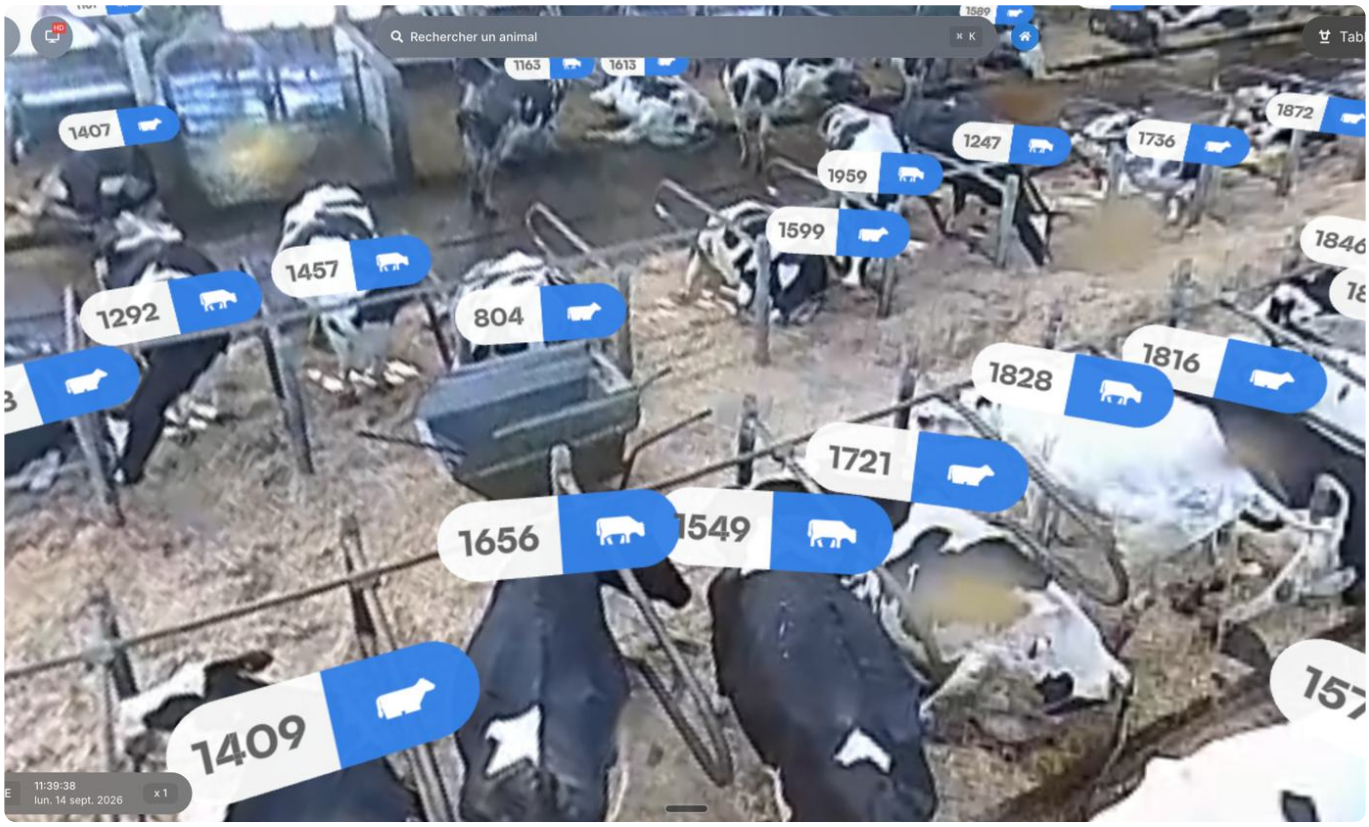
The building is filmed twenty-four hours a day, and the history is kept. On the day of an accident, the **time-stamped sequence** gives the farmer the proof that protects him.

VIDEO MONITORING THAT UNDERSTANDS WHAT IT SEES

An ordinary camera records. AiHerd knows what it is looking at: it tells an animal from a human, a normal posture from one that is not, and it never sleeps. That is the difference between reviewing the footage afterwards and being warned as it happens.

AN ALERT RATHER THAN AN AFTERMATH

Anything out of the ordinary triggers an instant notification, by day and by night, with the matching video. The farmer does not have to watch a screen: the screen calls him. And everything is kept: **an image that is useless most of the time is worth it on the day it is needed**.



LIVE VIEW OF THE CUBICLES, BY DAY AND BY NIGHT: EVERY LYING ANIMAL IS IDENTIFIED AND TRACKED, WITHOUT ANYONE HAVING TO WATCH THE SCREEN.

TODAY, ALREADY RUNNING ON FARM

- Continuous video monitoring of the building, day and night
- Critical real-time alerts, instant notification
- Complete, replayable history, time-stamped proof

IN DEVELOPMENT, OR PLANNED

- Animal in danger: an animal unable to get up, an animal trapped, a calf caught in the scraper
- Human intrusion or prowler
- Collapse or accident of a person, start of a fire
- Wild or pest animal in the barn
- Dangerous areas, fighting, animal in a forbidden area

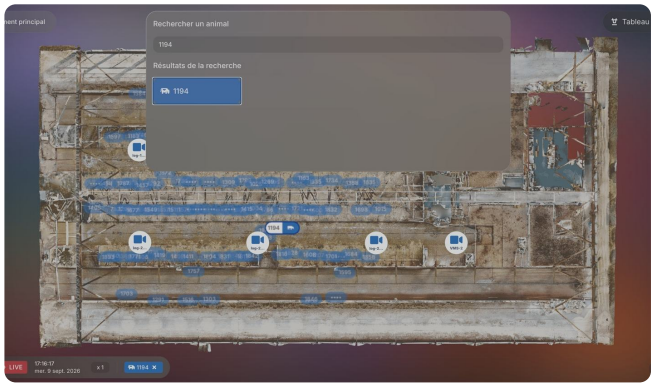
AREA 4: SMART BUILDING

Your building, as it is really used.

The same video stream that follows every cow draws a portrait of your barn: who crowds under the fans, which row of cubicles the cows are deserting, where the queue builds up.

A NUMBER, A CLICK, THE COW

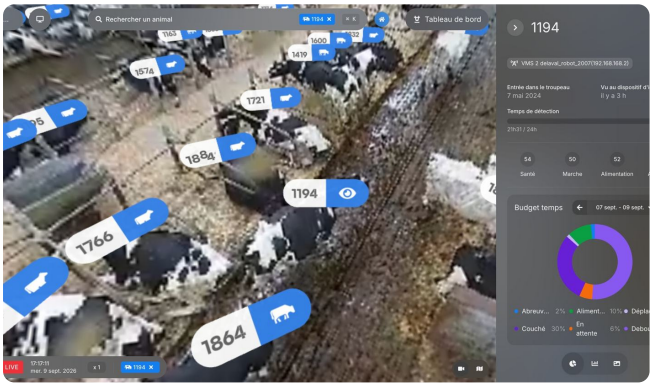
You type a cow's number into the search, and she appears in her real place on the map of the building. One click on her, and the camera that sees her opens live, her record alongside: detection time over twenty-four hours, four indicators, time budget.



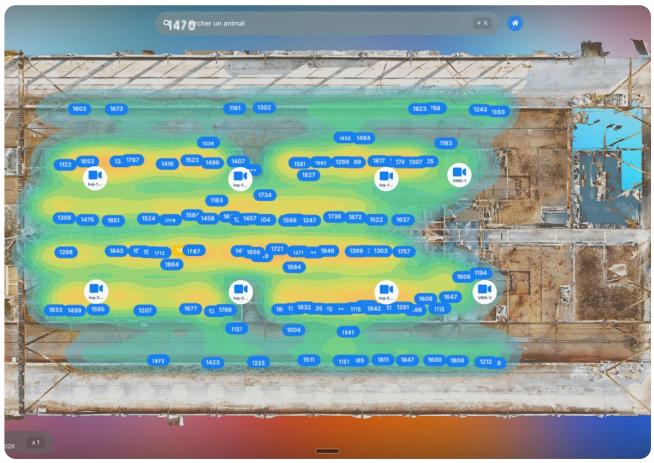
1. WE SEARCH FOR ANIMAL 1194: SHE SHOWS UP AT ONCE IN HER PLACE ON THE MAP.

AND HER WHOLE HISTORY

One more click, and her day replays hour by hour: where she went, the time spent at the feed fence, the corner where she isolated herself at three in the morning. None of this requires remembering to start a recording: it is kept by default.



2. ONE CLICK: THE CAMERA THAT SEES HER OPENS, HER RECORD ALONGSIDE.



OCCUPANCY HEATMAP ON THE MAP OF THE BUILDING: THE MOST FREQUENTED ZONES STAND OUT IN YELLOW AND ORANGE.

ACTUAL USE OF ZONES

Feed fence, drinkers, cubicles, feed barriers, alleys: the time spent in each zone is measured, not estimated. A group waiting too long at the drinker during a heat peak calls for an extra water point; a deserted row of cubicles calls for a mattress or an adjustment. Every piece of equipment installed becomes measurable, before and after.

What the heatmap shows at herd level, each cow's record gives at animal level: her **time budget**, split between the feed fence, the drinker, lying, standing and moving.

TODAY, ALREADY RUNNING ON FARM

- Locating an animal in the barn
- Live view of any animal
- Replay of an animal's whole history
- Actual use of zones: feed fence, drinkers, cubicles, feed barriers, alleys
- Mapping of herd movements

This area is fully available today, on every equipped farm. Nothing in it is pending.

AREA 5: MANAGEMENT, INTEGRATION AND CORRELATIONS

Managing the herd, and cross-referencing sources.

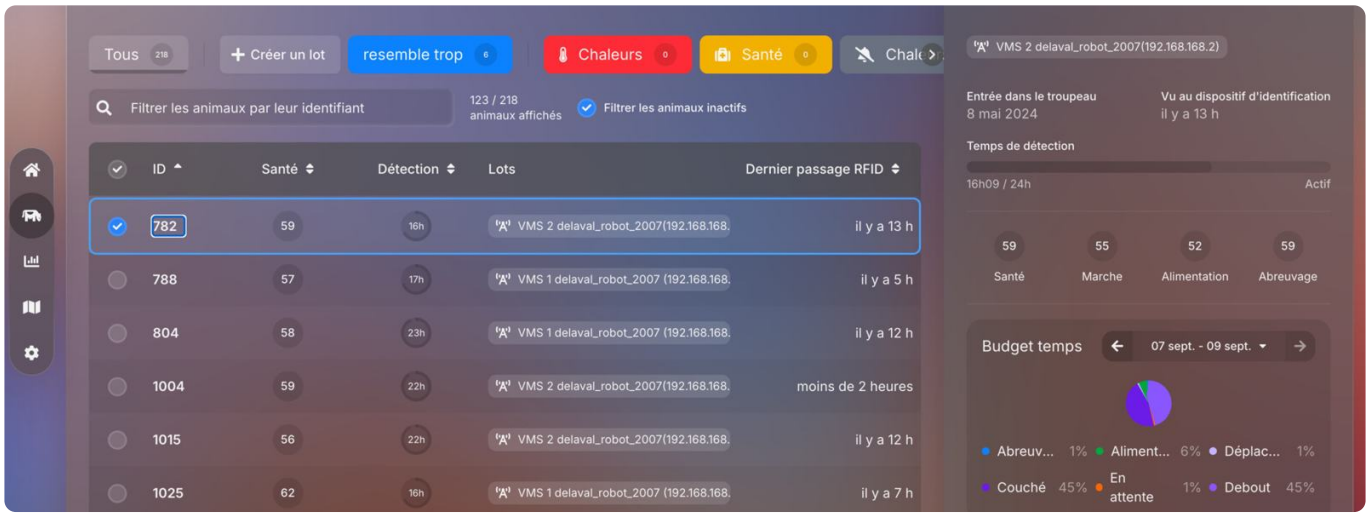
A single interface, web and mobile. A record per cow, herd management by groups, and curves the farmer builds himself.

THE HERD BY GROUPS

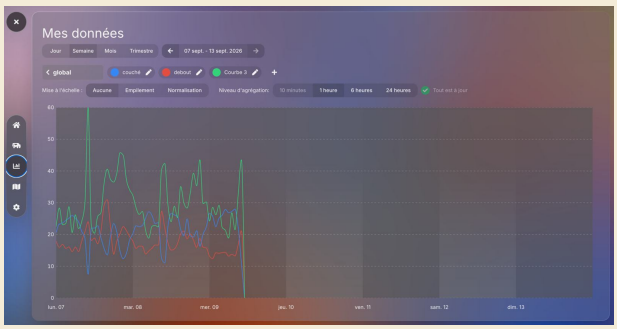
The herd can be filtered and grouped: the cows to watch for heat, those on a health alert, those of one milking robot, or a custom group. Every animal carries her four indicators, her trend, and her last pass through identification.

BUILDING YOUR OWN CURVES

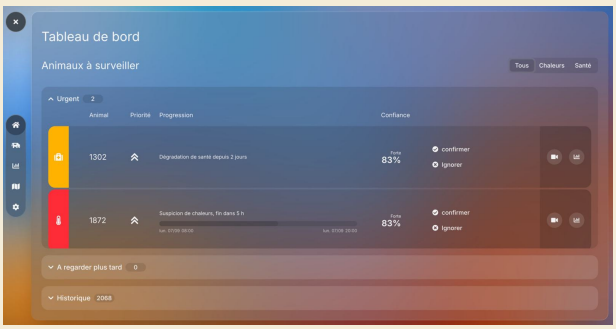
Lying time, standing time, attendance in a zone: you overlay the series of your choice, over a day, a week, a month or a quarter, and zoom in down to ten-minute steps. At herd level or for a single animal.



THE HERD, ITS GROUPS, AND THE COMPLETE RECORD OF THE SELECTED ANIMAL.



CURVES OVERLAID OVER ONE WEEK, AGGREGATION OF YOUR CHOICE.



THE MORNING DASHBOARD: THE ANIMALS TO WATCH, BY URGENCY.

TODAY, ALREADY RUNNING ON FARM

- Web interface and mobile app
- Complete record per cow, with her gallery and time budget
- Herd management by groups, filters and alerts

IN DEVELOPMENT, OR PLANNED

- Export and integration with farm software
- Multi-source correlations: cross-referencing vision and machine data
- An offer for solid-coloured herds

PROSPECTS

What the same installation will do tomorrow.

AiHerd improves remotely, through a simple update. A new service is deployed on the cameras already installed, **with no re-equipping of the animals and no changes to the building**. What is planned today is on farm tomorrow, on the same hardware.



THE SAME INFRASTRUCTURE, NEW SERVICES.

IN DEVELOPMENT, OR PLANNED

- Locating the precise origin of a lameness, not just detecting it
- A continuous locomotion score across the whole herd, to adjust trimming
- Detection of calvings and dystocia, day and night
- Body condition and weight loss, read from the silhouette
- Rumination and respiratory rate
- The alert for an animal in danger: an animal unable to get up, an animal trapped, a calf caught in the scraper
- A full video monitoring module with alarm system
- Finer behaviours: grooming, isolation, dominance

To know every cow is to add value to the whole herd.